

Appendix B

Sample Risk Management Scenarios

As a part of their responsibilities, flight instructors should include training on evaluating risk and using tools to manage risks including making go/no-go flight decisions. Once a pilot leaves the instructor's supervision, that pilot makes those decisions for him or herself.

The following scenarios are designed to provide a discussion platform that can be used to apply risk management procedures and checklists such as the PAVE checklists. Instructors are encouraged to add scenarios from personal experience or adapt other familiar scenarios. The answers and explanations to the questions for each of the following scenarios can be found at the end of this appendix.

VFR Scenarios

Scenario 1

You are a 32 year old, 325-hour, non-instrument-rated private pilot. You have about 75 hours on long cross-country flights including one less than 3 weeks ago. You and your wife are planning to leave after work for a 400 NM flight to attend your wife's best friend's 11:00 AM wedding the next day. You will take off about 30 minutes before sunset.

The current weather is good and the forecast calls for clear skies, good visibility, and negligible wind en route and at your destination. You have planned to cruise at 9,500 because about 250 miles of the route is over rugged terrain (few airports) that goes up to 7,500 feet. Your aircraft is a typical general aviation single, 160 horsepower (HP), 600-mile range, and no oxygen is available.

You have decided that the combination of fatigue, rough terrain, and night make this flight, as originally planned, undesirable.

Which of the potential solution(s) below would best manage the risk of this trip?

- a. Rearrange your work schedule to leave early and land in daylight.
- b. Get an airline reservation for your wife and delay your departure until tomorrow morning.
- c. Postpone the trip until tomorrow morning.

Scenario 2

It is early October, you have 135 hours in your logbook, and this is your first trip to see your mom since getting your license last summer. It will also be your longest trip—a little over 700 miles. You just took a 150-mile cross-country two weeks ago.

You recently asked your instructor to help you make up a personal SOP. You both agreed on the following rules: fuel reserves—1 hour day, 1½ hours night; ceiling—2,000 feet above your planned en route altitude; visibility—5 miles; a maximum work/duty day of 12 hours, with no more than 8 hours flying time; a minimum of 6 hours sleep.

You got an outlook weather briefing the night before, and the weather should be pretty good. You are making this trip to be at your Mom's 60th birthday party, but you told her that you would not come unless it's completely safe, and she understands. Your sister, Joan, will be there to help her celebrate, and you will see her when you are at Joan's on Halloween—that's less than a month away.

You told your Mom that you would give her a call after you have landed at your hometown. By the time Mom and Joan get to the airport, you will be done post-fighting, fueling, and tying down the plane. You will be ready to go. The forecast

at hometown calls for 2,500 scattered and visibility greater than 6 miles. The weather briefer told you that the minimum conditions en route would be 6,500 broken and 5 miles visibility. You are planning to cruise at 4,500, but you could go lower, except for that 100-mile section over the hills.

Allowing for the fuel and sandwich stop, you should get there about 4:00 PM. You expect to land with 1 hour and 20 minutes of fuel left in the tanks at the fuel stop, and 1 hour and 10 minutes left at your destination. Unfortunately, the airplane you are most comfortable with, 87EV, had to go into the shop. You have reserved the FBO's newest plane, 4892M, and your instructor told you that the only difference between it and 87EV is the avionics manufacturer. He also told you that he would make sure that you understood the avionics before you left.

You had a good night's sleep, and you are feeling great. You have reviewed the **IMSAFE** checklist, and you are ready to go.

Considering the PAVE checklist, which, if any, risk category factors are marginal for this flight?

- a. Pilot;
- b. Aircraft;
- c. enVironment;
- d. External Pressures

Based on these conditions, would you go on his trip, or not?

Scenario 3

You are a 350-hour non-instrument private pilot, and you are 3 hours into a 4-hour VFR cross-country. There is a stronger headwind than forecast, and while you left with 5 hours fuel, you think you are seeing a higher than normal fuel burn.

You are tired and hungry, and your wife has mentioned a need for a bathroom, and she is not about to use one of those plastic things you carry in your flight bag.

The weather at your destination is still VFR, but the temperature and dew point are closing as darkness falls. Your destination airport lies on the eastern edge of a very large lake and the winds are from the west.

You are thinking through the consequences of these issues and go back to your **PAVE** checklist.

Pilot

Aircraft

enVironment

External pressures

Based on this information, and considering the PAVE risk factor category(ies) that are marginal, should you continue on to your destination, or should you land at a suitable airport?

IFR Scenarios

Scenario 1

You are an IFR-rated private pilot with 850 hours, 50 of which are in actual IMC. You have planned a 325-mile trip to meet with an important client. The destination forecast is for IFR ceilings and visibilities with conditions tending to worsen at your ETA. Because of that, you have chosen a suitable alternate 100 miles distant, where the weather is forecast to be better.

You have performed the IMSAFE checklist and, while there is some stress associated with the business meeting, you are in fine shape, mentally and physically. While you are technically IFR current, the last approaches you flew were 4½ months ago.

This is your first trip to today's destination. You are looking forward to the flight so that you can check out your new IFR GPS. The only approach to your destination is a GPS stand-alone, and although you've never flown one, you have spent about an hour of GPS practice on a PCATD. Your client just called to tell you that it is critical that you make the meeting—he is leaving town that night.

Which choice from the list below reflects the best preflight risk management for this situation?

- a. You take off as scheduled, having made arrangements at the alternate to have a rental car ready should you need to land there and hope the weather holds.
- b. You rush your plans, leave early, and try to beat the worsening weather by arriving earlier.
- c. You decide that today is not the day to fly yourself to this destination. You move the meeting to later in the afternoon and catch an airline flight.

Scenario 2

You are an 845-hour private pilot with an instrument rating. You are planning a 475-mile winter trip with your wife and teenage son to visit relatives for the 3-day holiday weekend. You have recently purchased a 180 HP Cessna 172 that sports a service ceiling of 14,000 feet.

You have flown over the mountains once several years ago. The most direct route to your destination requires 13,500 feet to clear the mountain range by at least 1,000 ft. and the nearest airway Minimum Enroute Altitude is 14,000 feet. In spite of the fact that you really want to justify the utility of your airplane to your wife, you begin to doubt that your 172 is the right airplane for the trip.

Which of the options from the list below would make the aircraft risk factor acceptable for this trip?

- a. C-172. Fly the 172, but revise your schedule to allow more travel time and change your route to one with a 10,000-foot maximum airway MEA.
- b. PA-32. Schedule the FBO's Turbo Saratoga that you flew a couple of years ago, and get refresher checkout.
- c. C-172. Fly the 172 on the original route, but plan a stop at a 7,000-foot airport on this side of the highest ridges to check out conditions and get local advice. Take portable oxygen.

Scenario 3

You are an instrument-rated private pilot and have logged 942 hours since you started flying 5 years ago. You regularly fly your own, well-equipped Bonanza to see your company's customers within a 700-mile radius.

You are planning a 365-mile trip with Jim, your chief engineer, to visit a long-time client. You need to figure out what is going wrong with the newly installed framis plate—your company's newly upgraded flagship product. The client has just landed a significant government contract, but their new framis plate is holding up production. The client is so upset, that he is threatening to go to your competitor. You and Jim were at the office until 2:30 AM going over the calculations, and think you have a solution. You will only need a few hours to install the changes.

You have logged over 6 approaches and 12 hours actual instrument time during the last 2 months including three approaches with weather right at minimums. You also completed a Bonanza type refresher course less than a year ago.

The forecast for the destination airport is $\frac{3}{4}$ -mile visibility in rain and 300-foot overcast, with temporary conditions of $\frac{1}{4}$ mile in rain and fog and 100-foot overcast. The ILS approach decision height is 200 feet and the visibility minimum is $\frac{1}{2}$ mile. There are no thunderstorms observed or forecast and the freezing level is 2,000 feet above your filed altitude. These conditions are widespread and the best alternate is another 100 miles beyond the destination. The weather at the alternate just makes the legal minimums of a 600-foot ceiling and 2 miles visibility to qualify it as an alternate.

You estimate that you will have 1 hour of fuel at the alternate. The avionics suite in your Bonanza includes dual Nav/Com and an IFR GPS. After reading the DUAT printout, you review your **PAVE** checklist.

Pilot

Aircraft

enVironment

External pressures

Considering the following potential risk factors.

- A. Pilot proficiency
- B. Pressure to make the trip
- C. Thunderstorms or icing
- D. Aircraft performance
- E. Ceiling and visibility
- F. Avionics
- G. Fatigue
- H. Stress

Which, if any, of the potential risk factors would cause you to rate any of the PAVE risk categories as marginal?

Based on your PAVE checklist, should you go, or not go, on this trip?

Scenario 4

You are a 2,000-hour instrument rated pilot flying turbo-charged, complex single to a three-day seminar you're conducting. After departing a mid-point fuel stop for the final 2-½ hour leg, and climbing to VFR conditions on top of an overcast, the generator fails. The destination weather is forecast for overcast clouds at 1,000 feet and 3 miles visibility. You expect to arrive at your destination shortly before sunset.

Using your checklist, you accept the changed reality of this failure. Consider the following possible alternatives and choose the alternative(s) that would be acceptable ways to deal this change:

- a. Shut down all the electrical equipment and dead reckon to the destination. Over the destination, turn the master on and one NAV/COM for the approach.
- b. Declare an emergency with ATC, reduce electrical load, return and land at your fuel stop.
- c. Advise ATC of the problem, shut down all electrical equipment, and dead reckon to an area of known clear weather.

Answers and Explanations to Scenario Questions

VFR Scenario 1

- a. Rearrange your work schedule to leave early and land in daylight.

Leaving early to land in daylight reduces the performance level risk from fatigue and eliminates the night risk factor.

- b. Get an airline reservation for your wife, and delay your departure until tomorrow morning.

If you put your wife on an airline flight so she can be sure to make the wedding, you will reduce the pressure to make the flight the next day if there are uncomfortable levels of other risk at that time.

- c. Postpone the trip until tomorrow morning.

Postponing the trip until tomorrow morning reduces the performance level risk from fatigue and eliminates the night risk factors, but leaves no other option for making the wedding on time. You are vulnerable to the pressure to complete the flight even if other risk factors, such as weather, go above normal.

VFR Scenario 2

The only marginal **PAVE** checklist item is:

- 3. enVironment

At a cruising altitude of 4,500 feet (required over the hills), the forecast en route ceiling of 6,500 exactly equals the pilot's personal minimum of 2,000 feet above his cruising altitude (cloud heights in Area Forecasts are MSL unless denoted AGL or CIG). Likewise, the forecast en route visibility of 5 miles exactly equals the pilot's personal minimum. There is no room for the weather to deteriorate without going below the pilot's personal minimums, so the weather is a marginal item in the enVironment category.

PAVE checklist items that are not marginal:

- a. Pilot

You feel well, and you have satisfactorily completed the I'M SAFE checklist. You have recently completed your checkride and have 135 hours. You have also flown a cross-country flight within the last 2 weeks. You are qualified for this flight.

- b. Aircraft

This airplane is the same model airplane with which you are familiar, and you will get instruction on the avionics differences.

- c. External Pressures

You have worked out alternatives regarding seeing your mother, and no one will be meeting you until you call them on arrival.

Go/No-go decision following review of **PAVE** checklist:

Go

With only one risk factor marginal on your PAVE checklist, under most circumstances, you could comfortably decide to make this flight.

VFR Scenario 3

The marginal **PAVE** checklist items are:

- a. Pilot

You are hungry, fatigued, and feeling the stress from your wife's discomfort. These make the Pilot risk category marginal.

- b. Aircraft

You originally planned a 1-hour fuel reserve (5 hours of fuel for a planned 4-hour trip), but the headwind is stronger than forecast and your fuel burn appears to be higher than normal. Since you will no longer have the 1-hour fuel reserve you planned, the Aircraft risk category is marginal.

- c. enVironment

The airport location on the downwind side of a large lake and the closing temperature-dew point spread makes it likely that fog will form. This makes the enVironment category marginal.

The **PAVE** checklist item that is not marginal:

4. **External Pressures**

There is no indication of any additional external pressure to reach the destination other than your natural inclination to complete your planned trip.

Continue/Land decision following review of **PAVE** checklist:

Land

You should take action any time you have two or more **PAVE** risk categories that are marginal. If you are airborne, make the decision to land. In this case, the **Pilot** (hunger, fatigue, and stress from spouse), the **Aircraft** (reduced fuel reserve), and the **enVironment** (closing temperature-dew point spread) risk factors are all marginal. There is no indication that the **External Pressure** risk factor is marginal.

IFR Scenario 1

- a. You take off as scheduled, having made arrangements at the alternate airport to have a rental car ready should you need to land there, and hope the weather holds.

All the risk factors are still present, making the **Pilot**, **enVironment**, and **External Pressures** all marginal. Once airborne, your goal-orientated nature will pressure you to attempt to land at your destination (such as pressing minimums on the approach).

- b. You rush your plans, leave early, and try to beat the worsening weather by arriving earlier.

By rushing, you may take shortcuts and miss something in your planning, ground or inflight procedures, and you have now added the additional stress of trying to beat the weather.

- c. You decide that today is not the day to fly yourself to this destination. You move the meeting to later in the afternoon and catch an airline flight.

With marginal instrument proficiency and no in-cockpit experience flying GPS approaches, you have substantially increased risk in the **Pilot** category for this flight in addition to marginal risk factors in both the **enVironment** and **External Pressures** categories.

IFR Scenario 2

- a. C-172. Fly the 172, but revise your schedule to allow more travel time and change your route to one with a 10,000-foot maximum airway MEA.

Flying a route well within the capabilities of your airplane reduces the **Aircraft** risk factor.

- b. PA-32. Schedule the FBO's Turbo Saratoga that you flew a couple of years ago, and get refresher checkout.

Flying an airplane, such as a Turbo Saratoga that is capable of comfortably cruising at the airway Minimum Enroute Altitude or higher reduces the **Aircraft** risk factor.

- c. C-172. Fly the 172 on the original route, but plan a stop at a 7,000-foot airport on this side of the highest ridges to check out conditions and get local advice. Take portable oxygen.

The stop, getting local advice, and carrying oxygen do nothing about the risk of flying the 172 at its performance limit.

IFR Scenario 3

The marginal **PAVE** checklist items are:

a. Pilot

You are a current and proficient instrument pilot, but you have had less than 4 hours sleep, and you are stressed about your client's malfunctioning product. The Pilot risk category is marginal.

c. enVironment

There are no forecast thunderstorms and no mention of icing at your planned flight altitude, and the freezing level is 2,000 feet above it (freezing level forecasts are pretty dependable). However, the ceiling and visibility at the destination are generally expected to be slightly above the ILS approach minimums, there will be periods when the weather is expected to be lower than the minimums. The enVironment risk category is marginal.

d. External Pressures

You have a very strong motivation to make this trip, and that makes the External Pressures risk category marginal.

The **PAVE** checklist item that is not marginal:

b. Aircraft

It appears that this trip is comfortably within the capabilities of your airplane including the avionics suite.

Go/No-go decision following review of **PAVE** checklist:

No-Go

The **PAVE** checklist shows more than two risk categories as marginal leading to an insidious cumulative effect. If you have marginal items in two or more categories, do not go.

IFR Scenario 4

- a.** Shut down all the electrical equipment and dead reckon to the destination. Over the destination, turn the master on and one NAV/COM for the approach.

Reality is that the airplane has changed, and you need to come to terms with these changes. You must change your plans. There are many possible consequences of continuing to the destination including worsening weather and a significant possibility that you might have no battery power by the time you get there. Since your planned arrival is just before sunset, any delay will mean that you will arrive in the dark.

- b.** Declare an emergency with ATC, reduce electrical load, return and land at your fuel stop.

You would get ATC's full attention by declaring an emergency and have a better chance of landing with some electrical power.

- c.** Advise ATC of the problem, shut down all electrical equipment, and dead reckon to an area of known clear weather.

If you have good information on clear weather areas and plenty of fuel to get there, dead reckoning to such an area is a good alternative.

